962-33-1049 **Victor S Adamchik*** (adamchik@cs.cmu.edu), Department of Computer Science, Carnegie Mellon University, 5000 Forbes Av., Pittsburgh, PA 15213. *Some integrals associated with the Barnes G-function.* Preliminary report.

Recently the interest to the Barnes G-function defined by E.W. Barnes in 1899 as the generalization of the Euler gamma function and the solution (subject to the certain asymptotic behavior) to the following functional equation

$$\mathrm{G}(z+1) = \Gamma(z)\,\mathrm{G}(z)$$

$$\mathrm{G}(1) = 1$$

has beed revived. Based on the functional relation between G-function and the derivatives of the Hurwitz Zeta function

$$\log \mathrm{G}(z+1) - z \log \Gamma(z) = \zeta'(z) - \zeta'(-1, z)$$

a few new integral representations and special values of the Barnes G-function are derived. For example, the Binet-like formula

$$\log \mathrm{G}(z+1) = z \log \Gamma(z) + \zeta'(z) - \frac{1}{12} + \frac{z^2}{4} - \frac{\log z}{2}\, \mathrm{B}_2(z) -$$

$$\int_0^\infty \frac{e^{-tz}}{t^2}\left(\frac{1}{1-e^{-t}} - \frac{1}{t} - \frac{1}{2} - \frac{t}{12}\right) dt$$

Also the class of infinite sums which can be evaluated by means of G-function is presented. Finally, some numeric computational schemes are considered. (Received October 01, 2000)